

What is claimed is:

1. A polyamide composition which comprises:

- a) a slow crystallizing polyamide blend comprising (i) an amorphous, semiaromatic polyamide homopolymer, copolymer or mixture thereof and (ii) a semicrystalline, aliphatic polyamide homopolymer, copolymer or mixture thereof wherein in the weight ratio of (i):(ii) ranges from about 99:1 to about 30:70;
- b) at least one polyamide-compatible, oxidizable polydiene; and
- c) at least one oxidation promoting metal salt catalyst.

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2. The composition of claim 1 wherein said polyamide-compatible, oxidizable polydiene comprises a polybutadiene.

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3. The composition of claim 1 wherein said polyamide-compatible, oxidizable polydiene comprises an epoxy or anhydride functional polybutadiene.

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4. The composition of claim 1 wherein said polyamide-compatible, oxidizable polydiene is in the form of particles which are substantially uniformly distributed in the polyamide blend.

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5. The composition of claim 1 wherein said polyamide-compatible, oxidizable polydiene is in the form of particles whose average particle size is in the range of from about 10 nm to about 1000 nm, and which particles are substantially uniformly distributed in the polyamide blend.

6. The composition of claim 1 further wherein said oxidation promoting metal salt catalyst comprises a carboxylate.

7. The composition of claim 1 wherein said oxidation promoting metal salt catalyst is selected from the group consisting of metal acetates, stearates, propionates, hexanoates, octanoates, benzoates, salicylates, cinnamates, or combinations thereof.

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8. The composition of claim 1 wherein said oxidation promoting metal salt catalyst is selected from the group consisting of a cobalt, copper or ruthenium, acetate, stearate, propionate, hexanoate, octanoate, benzoate, salicylate, cinnamate, or combinations thereof.

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9. The composition of claim 1 further comprising a clay.

10. The composition of claim 1 further comprising a clay whose average platelet thickness is in the range of from about 1 nm to about 100 nm and whose average length and average width are each in the range of from about 50 nm to about 500 nm.

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11. The composition of claim 1 wherein said semicrystalline, aliphatic polyamide is selected from the group consisting of polyamides 6; 6,6; 7; 10;

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11; 12; 6,10; 6,9; 4,6; 6,6/6; and 6/6,6, and mixtures thereof.

12. The composition of claim 1 wherein said amorphous, semiaromatic polyamide is selected from the group consisting of polyamides 6I; 6I/6T; 6/6I; MXDI; 6/MXDI, and mixtures thereof.

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13. The composition of claim 1 wherein said semicrystalline, aliphatic polyamide comprises nylon 6.

14. The composition of claim 13 wherein said at least one polyamide-compatible, oxidizable polydiene comprises polybutadiene.

5 15. The composition of claim 14 wherein said polybutadiene is a functionalized oligomer.

16. The composition of claim 13 wherein said amorphous, semiaromatic polyamide comprises poly(hexamethylene isophthalamide-co-terephthalamide).

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17. The composition of claim 16 wherein said weight ratio of (i):(ii) ranges from about 80:20 to about 35:65.

15 18. The composition of claim 16 wherein said composition further comprises a clay.

19. The composition of claim 1 wherein said semicrystalline, aliphatic polyamide comprises nylon 6,6.

20 20. The polyamide composition of claim 1 wherein said polyamide blend exhibits either no Tcc or a Tcc of about 150°C or less upon cooling from the melt at a cooling rate of 20°C/min. as determined by differential scanning calorimetry.

25 21. The polyamide composition of claim 1 wherein said composition comprises a blend of said polyamide blend and said at least one polyamide-compatible, oxidizable polydiene.

22. The polyamide composition of claim 1 wherein said composition comprises a reaction product of said polyamide blend and said at least one polyamide-compatible, oxidizable polydiene.

5 23. An oxygen barrier film comprising a layer of a polyamide composition which comprises:

- a) a slow crystallizing polyamide blend comprising (i) an amorphous, semiaromatic polyamide homopolymer, copolymer or mixture thereof and (ii) a semicrystalline, aliphatic polyamide homopolymer, copolymer or mixture thereof wherein in the weight ratio of (i):(ii) ranges from about 99:1 to about 30:70;
- 10 b) at least one polyamide-compatible, oxidizable polydiene; and
- c) at least one oxidation promoting metal salt catalyst.

15 24. The oxygen barrier film of claim 23 which is oriented.

25. The oxygen barrier film of claim 23 further comprising a thermoplastic polymer layer on one or both sides of the polyamide composition layer.

20 26. A multilayer article which comprises:

- a) a polyamide composition layer comprising a slow crystallizing polyamide blend comprising (i) an amorphous, semiaromatic polyamide homopolymer, copolymer or mixture thereof and (ii) a semicrystalline, aliphatic polyamide homopolymer, copolymer or mixture thereof wherein in the weight ratio of (i):(ii) ranges from about 99:1 to about 30:70; at least one polyamide-compatible, oxidizable polydiene; and at least one oxidation promoting metal salt catalyst; and
- 25 b) a thermoplastic polymer layer on one or both sides of said polyamide composition layer.

27. The multilayer article of claim 26 wherein said thermoplastic polymer layer comprises a polyolefin or polyester.

5 28. The multilayer article of claim 26 wherein said thermoplastic polymer layer comprises a polyethylene terephthalate.

29. The multilayer article of claim 28 wherein said polyamide blend comprises a blend of nylon 6I/6T and nylon 6.

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30. The multilayer article of claim 29 wherein said polydiene is polybutadiene.

31. The multilayer article of claim 30 wherein said oxidation promoting metal salt catalyst comprises a cobalt carboxylate salt.

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32. The multilayer article of claim 31 which is in the form of a bottle or container.

20 33. The multilayer article of claim 26 wherein said thermoplastic polymer layer and polyamide composition layer are attached to one another by coextrusion, lamination or coinjection.

34. A shaped article which comprises a polyamide composition comprising:

25 a) a slow crystallizing polyamide blend comprising (i) an amorphous, semiaromatic polyamide homopolymer, copolymer or mixture thereof and (ii) a semicrystalline, aliphatic polyamide homopolymer, copolymer or mixture

thereof wherein in the weight ratio of (i):(ii) ranges from about 99:1 to about 30:70;

b) at least one polyamide-compatible, oxidizable polydiene; and

c) at least one oxidation promoting metal salt catalyst.

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35. The shaped article of claim 34 which is in the form of a bottle or container.

36. The shaped article of claim 35 further comprising at least one layer of polyethylene terephthalate.

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37. A process for producing a polyamide composition which comprises:

a) melting a slow crystallizing polyamide blend comprising (i) an amorphous, semiaromatic polyamide homopolymer, copolymer or mixture thereof and (ii) a semicrystalline, aliphatic polyamide homopolymer, copolymer or mixture

15 thereof wherein in the weight ratio of (i):(ii) ranges from about 99:1 to about 30:70;

b) blending the molten polyamide blend with at least one polyamide-compatible, oxidizable polydiene and at least one oxidation promoting metal salt catalyst to thereby form a mixture; and

20 c) cooling the mixture.

38. A process for producing an oxygen barrier film which comprises:

a) melting a slow crystallizing polyamide blend comprising (i) an amorphous, semiaromatic polyamide homopolymer, copolymer or mixture thereof and (ii) a

25 semicrystalline, aliphatic polyamide homopolymer, copolymer or mixture thereof wherein in the weight ratio of (i):(ii) ranges from about 99:1 to about 30:70;

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- b) blending the molten polyamide blend with at least one polyamide-compatible, oxidizable polydiene and at least one oxidation promoting metal salt catalyst to thereby form a mixture;
- c) extruding, casting or blowing the mixture into a film; and
- 5 d) cooling the film.

39. The process of claim 38 wherein said film is subsequently oriented.

40. A process for producing a multilayer article which comprises:

- 10 a) melting a slow crystallizing polyamide blend comprising (i) an amorphous, semiaromatic polyamide homopolymer, copolymer or mixture thereof and (ii) a semicrystalline, aliphatic polyamide homopolymer, copolymer or mixture thereof wherein in the weight ratio of (i):(ii) ranges from about 99:1 to about 30:70; at least one polyamide-compatible, oxidizable polydiene; and at least one
- 15 oxidation promoting metal salt catalyst to thereby form a mixture;
- b) separately melting a thermoplastic polymer composition;
- c) coextruding, casting, blowing, thermoforming, blow molding or coinjecting the mixture and thermoplastic polymer composition into a multilayer article; and
- 20 d) cooling the article.

41. The process of claim 40 wherein said article is in the form of a film, a bottle or a container.

- 25 42. The process of claim 40 wherein said article is a film which is subsequently oriented.

43. The process of claim 40 wherein said polyamide is melted prior to blending with said oxidizable polydiene.

44. The process of claim 40 wherein said polyamide and said oxidizable polydiene are melted after blending.

5 45. A process for producing a multilayer article which comprises:

- a) melting a slow crystallizing polyamide blend comprising (i) an amorphous, semiaromatic polyamide homopolymer, copolymer or mixture thereof and (ii) a semicrystalline, aliphatic polyamide homopolymer, copolymer or mixture thereof wherein in the weight ratio of (i):(ii) ranges from about 99:1 to about 10 30:70; at least one polyamide-compatible, oxidizable polydiene; and at least one oxidation promoting metal salt catalyst to thereby form a mixture;
- b) separately melting a thermoplastic polymer composition;
- c) coinjecting molding the mixture and thermoplastic polymer composition into a multilayer preform;
- 15 d) reheating the perform; and
- e) blow molding the perform into a multilayer article.

46. A multilayer article formed by a process comprising:

- a) melting a slow crystallizing polyamide blend comprising (i) an amorphous, semiaromatic polyamide homopolymer, copolymer or mixture thereof and (ii) a semicrystalline, aliphatic polyamide homopolymer, copolymer or mixture thereof wherein in the weight ratio of (i):(ii) ranges from about 99:1 to about 20 30:70; at least one polyamide-compatible, oxidizable polydiene; and at least one oxidation promoting metal salt catalyst to thereby form a mixture;
- 25 b) separately melting a thermoplastic polymer composition;
- c) coinjecting molding the mixture and thermoplastic polymer composition into a multilayer preform;
- d) reheating the perform; and

e) blow molding the perform into a multilayer article.

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